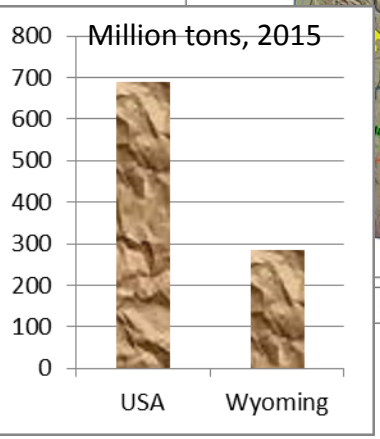
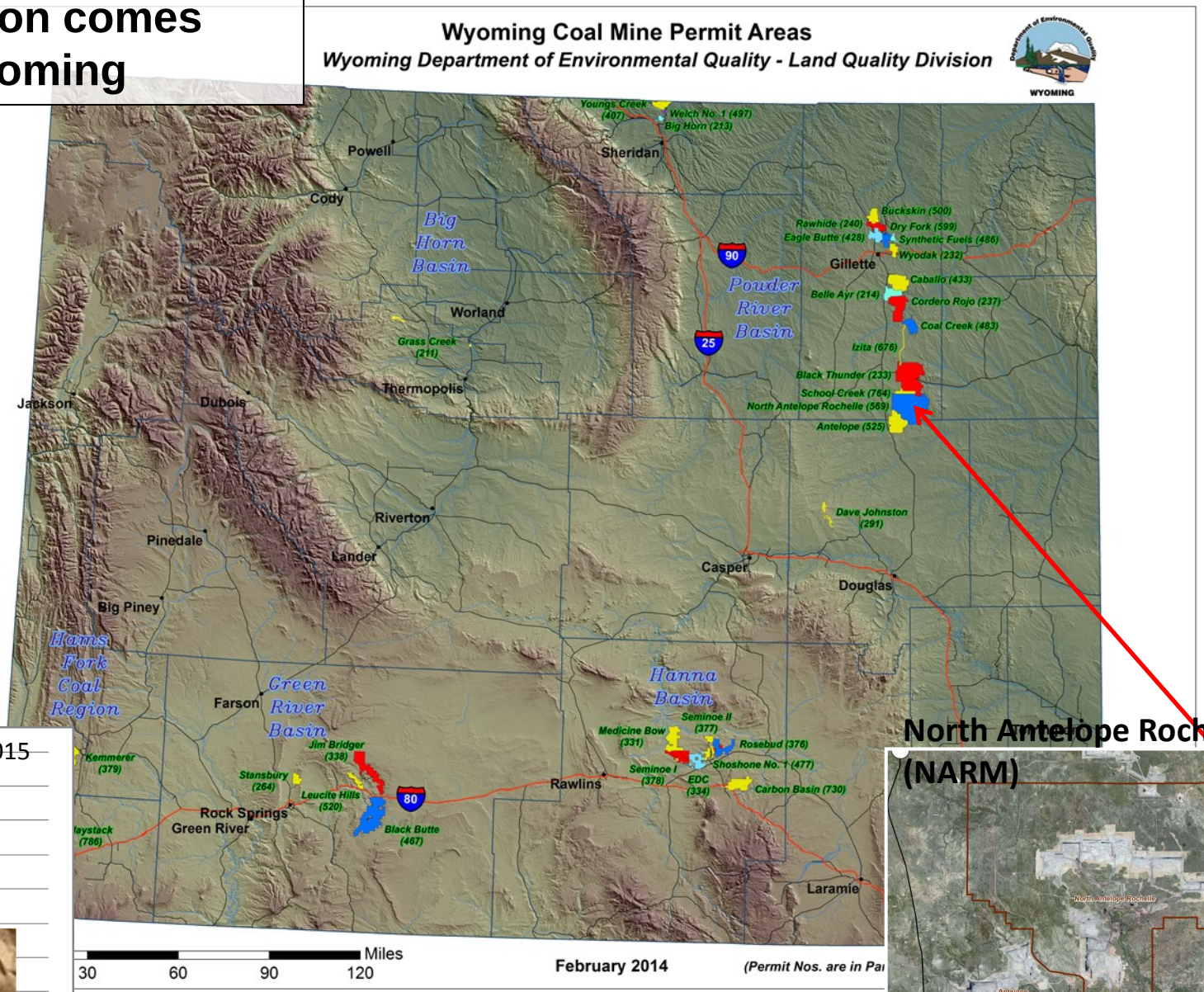
Bond release verification requirements for successful reclamation at Wyoming surface coal mines

Dr. Anna Krzyszowska Waitkus

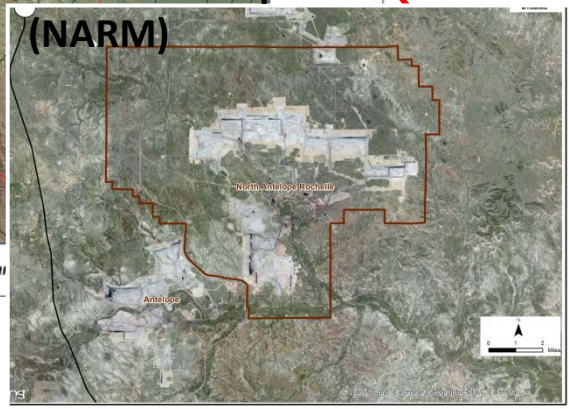
- Coal bond release procedure in Wyoming
- Coal bond release verification criteria and performance standards
- Tracking bond release at a large Wyoming coal mining operation

41% of USA total coal production comes from Wyoming





North Antelope Rochelle Mine (NARM)



Reclamation bond

The Federal, Surface Mining Control and Reclamation Act (SMCRA) requires as a condition for obtaining a coal mining permit posting a reclamation performance bond to ensure that:

- regulatory authority will have sufficient funds to reclaim the site if the permittee fails to complete the reclamation plan approved in the permit.

- regulatory authority will have sufficient funds to hire a third party to complete the reclamation plan in the event of a bankruptcy of the coal mine company.

Total bond for minerals mined in Wyoming (November 2014)

Mineral	Bond, $	%
Coal, 35 coal mines	**2,828,871,264**	82
Uranium	375,450,294	11
Trona	149,516,450	4
Bentonite	70,432,273	2
Sand & gravel, granite, limestone, sandstone, clay, decorative rock, diamonds, dolomite, feldspar, gravel, gypsum, iron, jade, leonardite, opal, quartzite, sand, scoria, shale	42,694,405	1
Total	**3,466,964,687**	100

Reclamation bond

- The permittee may apply for bond release through incremental bond release phases as the permittee completes phases of reclamation.
- Wyoming Department of Environmental Quality (WDEQ), Land Quality Division (LQD) approves reclamation bond submitted by the permittee through Annual Reports.
- Bond release - reduction of the reclamation bonds and the financial risk to the public.

Wyoming reclamation bond release procedures

There are two steps to release a bond:

1. Verification and evaluation of bond release criteria and performance standards for reclaimed areas.

2. Reclamation bond release approval of areas that were verified.

Bond release phases and bond release verification criteria, WY

Each of the bond release phases has certain criteria and performance standards (permit commitments) that must be met before the bond is released.

	Bond release phases	Verification of the bond release criteria
	Area Bond	Backfilling, regrading completed according to the approved plan
60%	Phase 1	Stream channels reconstructed
		Soil applied
	Phase 2	Vegetation established (ocular evaluation)
15%		Surficial stability established
		Permanent impoundment construction/renovation designed and State Engineer Office approved
	Phase 3	Revegeation success standards established (statistical analysis)
25%		Mitigation of wetlands (approved by the US Army Corps of Engineers)
		Trees established

Reclamation bond release procedures

How this is done at the State of Wyoming ?

1. Bond release verification request for specific areas (submittals by the operator)
   - inspections by the WDEQ/LQD of the requested area
   - reviews of the submitted information
   - approval of the request within 60 days from the submittal

2. Bond release request for areas that have already been verified.
   - declaration of completion within 15 days from the approved submittal.

3. After approval by the WDEQ/LQD - the public is notified.

   - public notice asking for comments/objections is published in a local newspaper at least once per week for four consecutive weeks.

4. WDEQ/LQD, OSMRE (federal agency) representatives, and the land owners perform the inspection of the bond release requested areas together.

5. Reclamation bond release for requested areas is approved.

Wyoming guidelines, bond release

Cooperative effort:

- WDEQ/LQD
- coal industry
- Office of Surface Mining, Reclamation and Enforcement (OSMRE)
- consultants

- Guideline No. 20 - Bond Release Categories and Submittal Procedures for Coal Mines
- Guideline No. 21 – Area Bond and Rough Backfill Verification Procedures for Coal Mines
- Guideline No. 22 - Verification for Phase 1 Bond Release for Coal Mines
- Guideline No. 23 – Verification fro Phase 2 Bond Release Procedures for Coal Mines
- Guideline No. 25 – Verification for Phase 3 Bond Release Procedures for Coal Mines

http://deq.wyoming.gov/lqd/resources/guidelines/

Bond release verification procedures

What?

Verification of the:

- **criteria**
- **performance standards**

How?

- **Field inspections**
- **Annual reports**
- **Reviews**

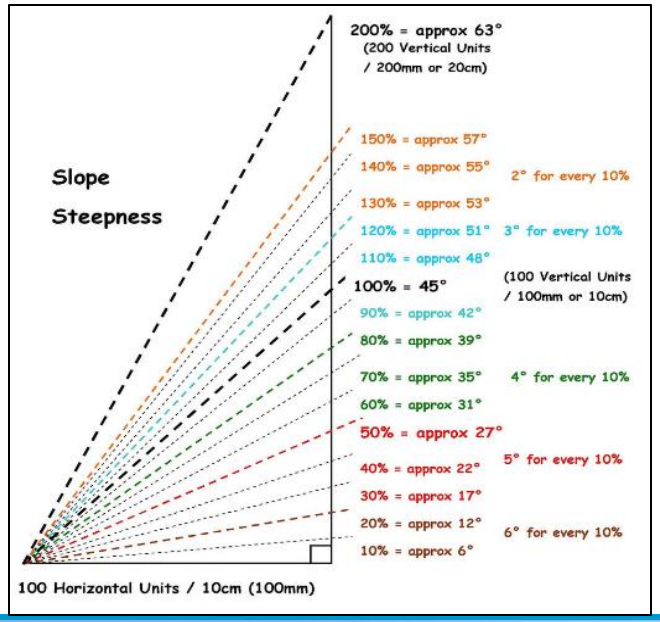
Area Bond

Rough Backfill verification

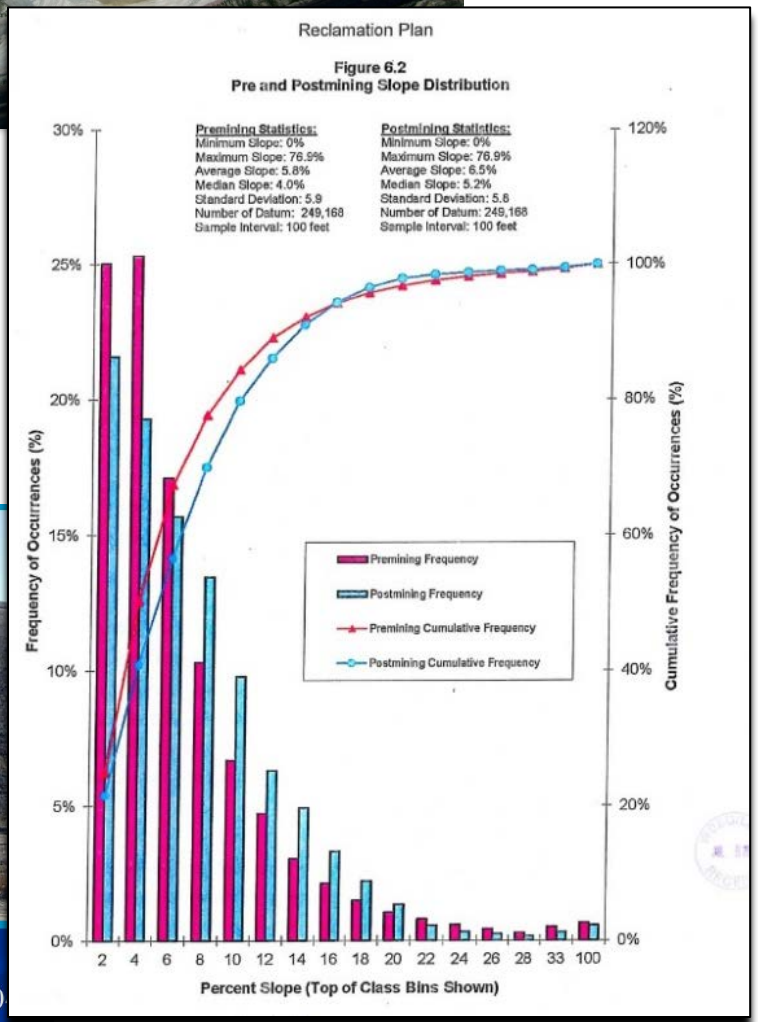
- “As built” map demonstrating acceptable postmining topography (PMT).
- Elevation tolerance (reclaimed elevation are within +/- 20 feet of the approved PMT).
- Drainage divides match those of the approved PMT.
- Hill slopes lengths and profiles (complex hill slope profile).
- Valley bottom alignment, slopes and profile (generally flattening in a downstream direction).
- Special commitments (Alluvial Valley Floors construction).

Area Bond

Rough backfill verification



Graded slope at North Antelope
Rochelle Mine (Anna Waitkus, 200



Phase 1- Stream Channels Reconstruction

- Permanent diversions and restored stream channels have been constructed per approved designs and are stable (no erosion).

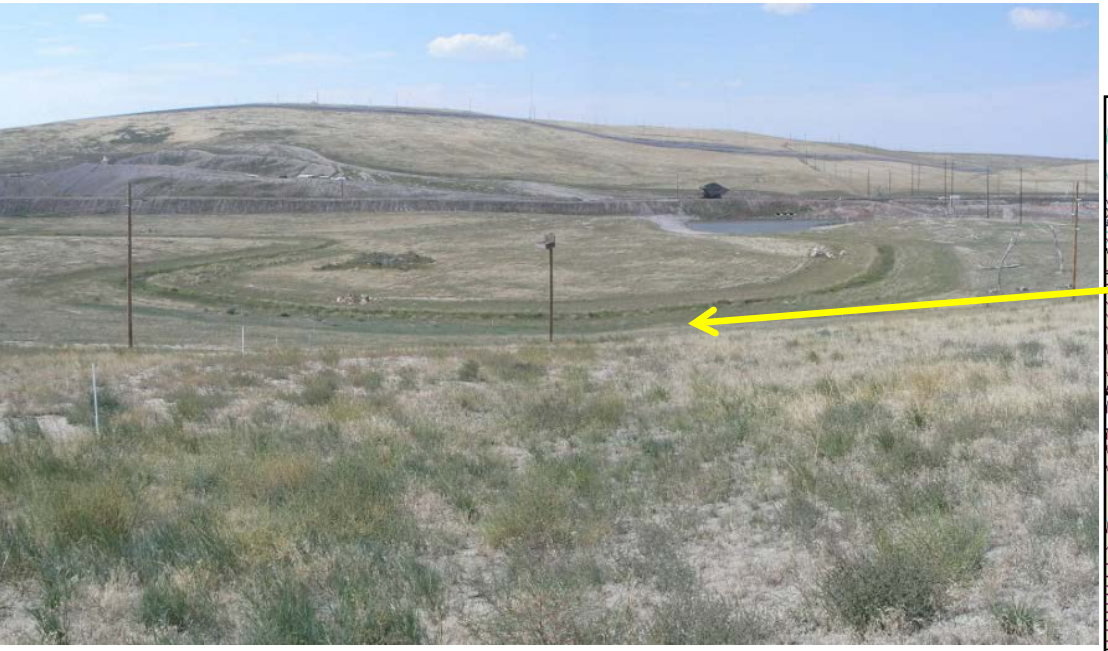
- Rebuilt drainages must meet the premine drainage elevations and must “tie-in” to existing drainages in the surrounding native areas.

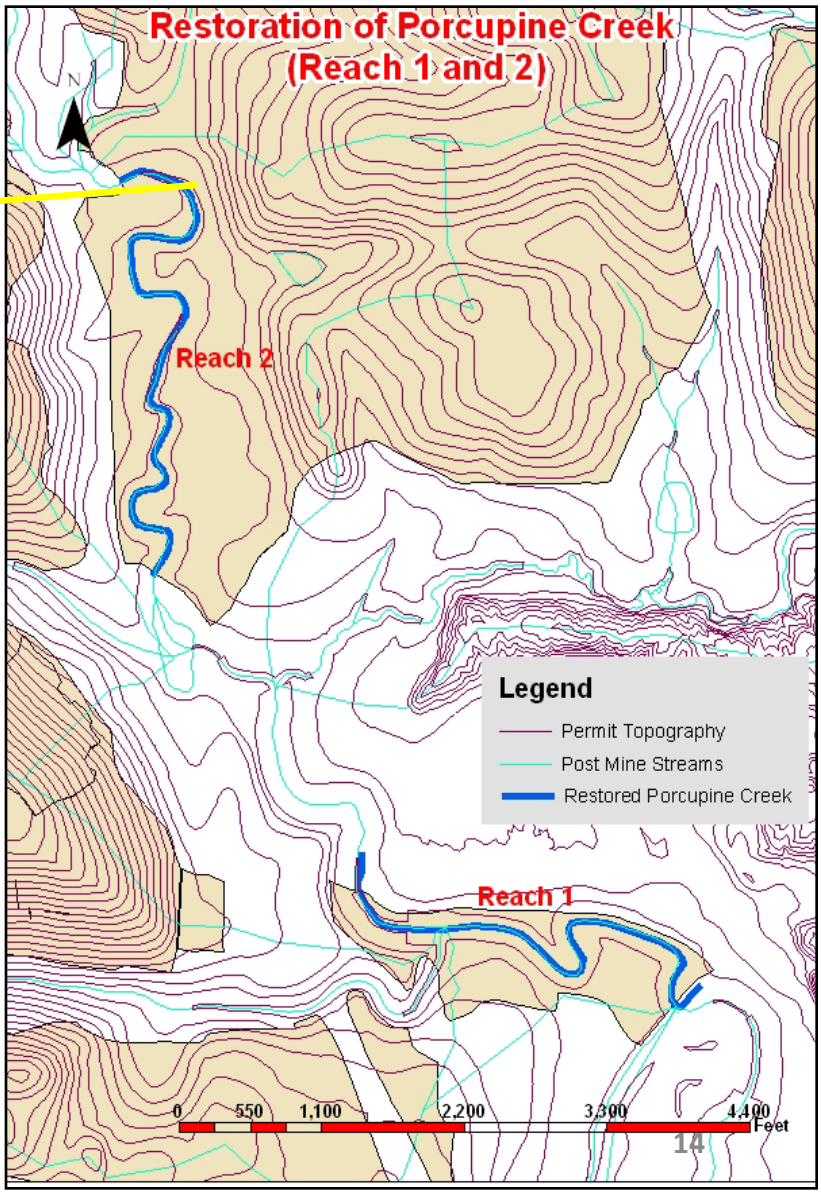
- Rebuilt all suitable channel morphology (gradients, lengths, profiles, sinuosity) for all channels with a drainage area greater than 50 acres.

- No depression >0.5 acre-ft. unless approved.

- Suitable backfill quality in drainage channels and floodplains.

Phase 1- Stream Channel Reconstruction Verification





- During the inspection, the reconstructed Porcupine Creek was surveyed by the LQD inspector using a handheld Geographic Positioning System (GPS) unit.

- The surveyed channel was overlaid on the permit map to compare the restored location of the creek to the original channel.

- Results were very good.

Phase 1 – Soil depth verification

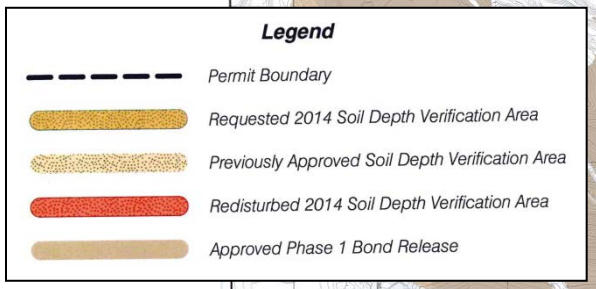
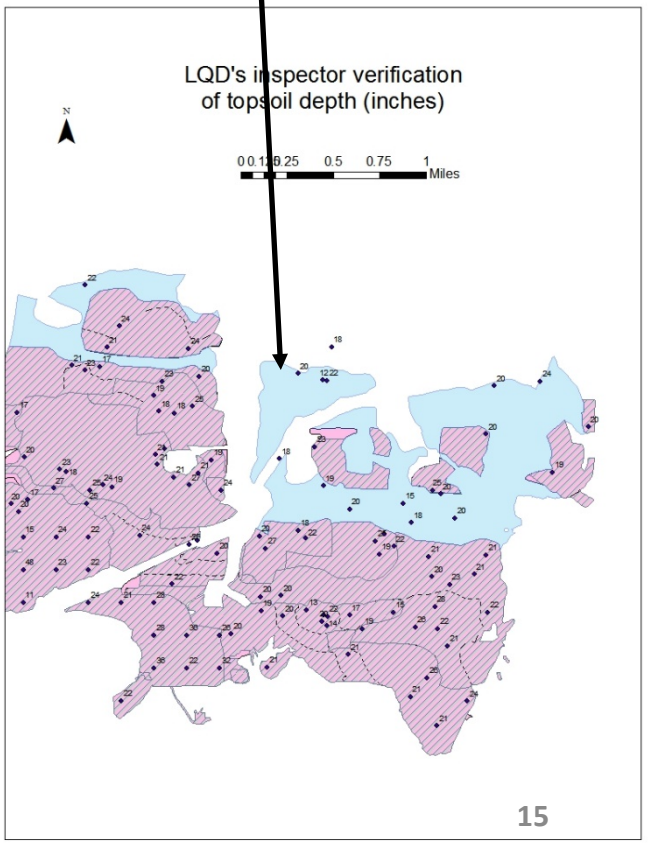


Table 3: Requested SDV Areas

Topsoil Replacement Unit Identification (Temporary ID)	Area Extent of Unit (Acres)	Average Topsoil Replacement Depth (Inches)	**Average Topsoil Replacement Depth, LQD Inspections (Inches)[2]**	**Average Topsoil Replacement Depth of LQD Inspections & NARM Measurements (Inches)**	Volume of Topsoil Applied to Unit **Using LQD & NARM Avg. Depth** (Cubic Yards)
SDV14_01	134.7	18.0	**22**	**20**	**362,193**
SDV14_02	105.7	18.0	**18 (12,22,20)**	**18**	255,794
SDV14_03	509.3	18.6	**19.5 (24,19,20,15,18, 20,20,20)**	**19.1**	**1,307,826**
SDV14_04	12.8	12.0	-	**12**	20,651
SDV14_05[1]	120.9	14.4	**15**	**14.7**	**238,939**
SDV14_06	42.6	12.0	-	**12**	68,728
Total	926.0				**2,254,131**



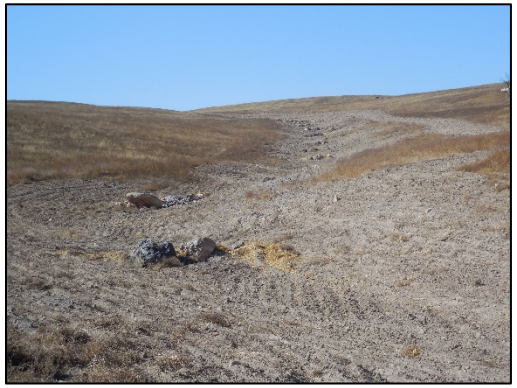
Phase 2

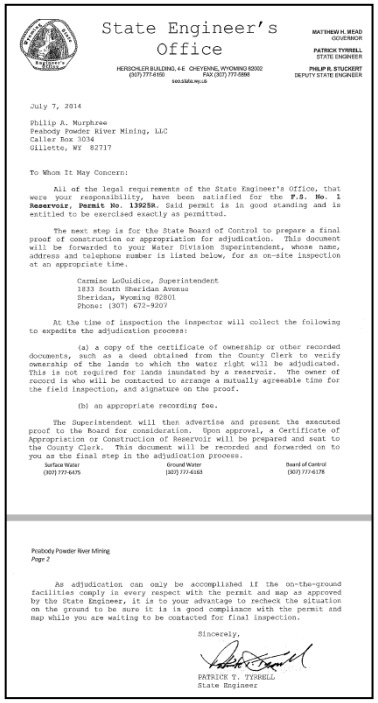
Verification of:

- ocular vegetation establishment
- surficial stability

Phase 1 Phase 2

Reclamation Area	Rec. Unit ID#	Legal Description	Size (Acres)	Date of Backfilling and Grading	Topsoil Replacement			Approval Date Regraded Spoil Release	Correspondence Reference ID	Date of Permanent Planting	Revegetation Seed Mixture	Notes
					Year	Req'd Depth	Inspection Dates					
Area F	04A1	T36N, R75W, SE1/4, SE1/4 Sec 21	32.24	2000-2004	2004	15"	10/05/04	07/14/04	TFN 4 3/159	2004	upland	
	04A1	T36N, R75W, NW1/4, SW1/4, Sec 22	17.66	2000-2004	2004	22.5"	10/05/04	07/14/04; 09/03/04	TFN 4 3/159; TFN 4 1/173	2004	upland	
	04A1	T36N, R75W, NW1/4, SW1/4, Sec 22	12.05	2000-2004	2004	22.5"	10/05/04	07/14/04	TFN 4 3/159	2004	upland	
	05A1	T36N, R75W, NW1/4, SW1/4 Sec 22	1.46	2000-2005	2004	22.5"	10/05/04	07/14/04	TFN 4 3/159	2005	upland	
	05A1	T36N, R75W, SW1/4, SW1/4 Sec 22	98.16	2000-2004	2005	15-22.5"	7/6/2005; 12/09/04	5/19/2005; 12/25/05; 9/03/04	TFN 4 6/210; TFN 4 6/248; TFN 4 1/173	2005	upland	





State Engineer's Office

MATTHEW H. MEAD GOVERNOR

PATRICK TYRRELL STATE ENGINEER

PHILIP B. STUCKERT DEPUTY STATE ENGINEER

HERSCHLER BUILDING, 4-E CHEYENNE, WYOMING 82002 (307) 777-6150 FAX (307) 777-5986 seo.state.wy.us

July 7, 2014

Philip A. Murphree
Peabody Powder River Mining, LLC
Caller Box 3034
Gillette, WY 82717

To Whom It May Concern:

All of the legal requirements of the State Engineer's Office, that were your responsibility, have been satisfied for the **F.S. No. 1 Reservoir, Permit No. 139259.** Said permit is in good standing and is entitled to be exercised exactly as permitted.

The next step is for the State Board of Control to prepare a final proof of construction or appropriation for adjudication. This document will be forwarded to your Water Division Superintendent, whose name, address and telephone number is listed below, for as on-site inspection at an appropriate time.

Carmine LoDuidice, Superintendent
1833 South Sheridan Avenue
Sheridan, Wyoming 82801
Phone: (307) 672-9207

At the time of inspection the inspector will collect the following to expedite the adjudication process:

(a) a copy of the certificate of ownership or other recorded documents, such as a deed obtained from the County Clerk to verify ownership of the lands to which the water right will be adjudicated. This is not required for lands inundated by a reservoir. The owner of record is who will be contacted to arrange a mutually agreeable time for the field inspection, and signature on the proof.

(b) an appropriate recording fee.

The Superintendent will then advertise and present the executed proof to the Board for consideration. Upon approval, a Certificate of Appropriation or Construction of Reservoir will be prepared and sent to the County Clerk. This document will be recorded and forwarded on to you as the final step in the adjudication process.

Surface Water (307) 777-6475 Ground Water (307) 777-6163 Board of Control (307) 777-6178

Peabody Powder River Mining
Page 2

As adjudication can only be accomplished if the on-the-ground facilities comply in every respect with the permit and map as approved by the State Engineer, it is to your advantage to recheck the situation on the ground to be sure it is in good compliance with the permit and map while you are waiting to be contacted for final inspection.

Sincerely,

PATRICK T. TYRRELL
State Engineer

- permanent water impoundment construction
  - Verified if the surface landowner has consented.
  - Verified if State Engineer's Office (SEO) has approved the impoundment for its intended use.

Phase 3- verification submittals

Approved postmining land uses have been restored

- Achievement of the revegetation performance standards
- Achievement of the shrub stablishment goals and/or standards
- Achievement of the tree replacement standards
- Successful restoration of wildlife habitat
- Postmining ground water supports the approved postmining land uses
- Postmining surface water quality and quantity support the approved postmining land use and minimize impacts to the hydrologic balance
- All approved postminng road types and corridors are in place and functional in support of approved postminng land uses
- Removal of all temporary structures

Phase 3 - achievement of the revegetation performance standards

Requirements	Goals, standards
Vegetation	Production and cover estimated on reclaimed areas and compared with baseline
Vegetation sampling	Two years of monitoring data at the end of 10 year periods of vegetation establishment
Species composition/diversity	Quantitative and qualitative analysis of reclaimed areas compared to baseline based on: - Species and life form % cover - Relative cover - Relative frequency
Shrub density	Goal – 1 shrub/m^2 on 10% land (3/27/1981-8/6/1996) Standard – 1 shrub/m^2 on 20% land (post 8/6/1996)
Tree density	The same as pre-mining (80% of trees have been in place for 8 years)

Phase 3 - achievement of revegetation goals

Verified if bond for revegetation has been retained for at least ten years after the operator has completed seeding and other work to ensure revegetation.

Photo 10 - Dave Johnston Mine - Big Sagebrush Areas - 2014

Revegetation sampling methods:

- A map with vegetation units and Reference Areas.
- Vegetation description: composition, the major species, cover.
- Vegetation sampling time (after June 1st and before September 1st)
- Statistical analysis of results from transect points showing that: total plant cover, total ground cover, perennial production, species compositions of the reclaimed areas are comparable with standards derived from the Reference Area.

Phase 3 -Postmining ground and surface water

Goals of the reclaimed mine land:

- Supports the postmining land use (grazing, wildlife use, pasture, cropland).
- Minimize disturbances to the hydrologic balance.
- Provides a rate of recharge that approximates the premining recharge rate.

Verification:

- WDEQ/LQD reviews data annually and decides if the groundwater quality and quantity are trending toward baseline or groundwater uses.

- WDEQ/LQD reviews surface water quality data and decides if water quality is within standards for livestock uses.

Reclamation bond, example

Cost of the incremental phases of contemporaneous reclamation (Phase 1) as of 2014 (calculation from the mine's 2014-2015 Annual Report) for a coal mine.

Phases of reclamation	1 ac
Area bond (including backfilling, rough and final grading)	$13,627
Topsoil replacement, scarifying and seeding	$2,418
TOTAL	**$16,0445**

Reclamation results at a large western US surface coal mine

Photos taken from the same location at the North Antelope Rochelle Mine (NARM)

How do we track all bond release verification criteria, performance standards and bond release areas?

GIS/GPS approach

- Using a Geographic Information System (GIS) Bond Release Geodatabase to track the verification of environmental performance standards and reclaimed areas that have achieved bond release at NARM.

- Using a Geographic Positioning System (GPS) equipment to verify the reclamation and bond release compliance requirements during inspections.

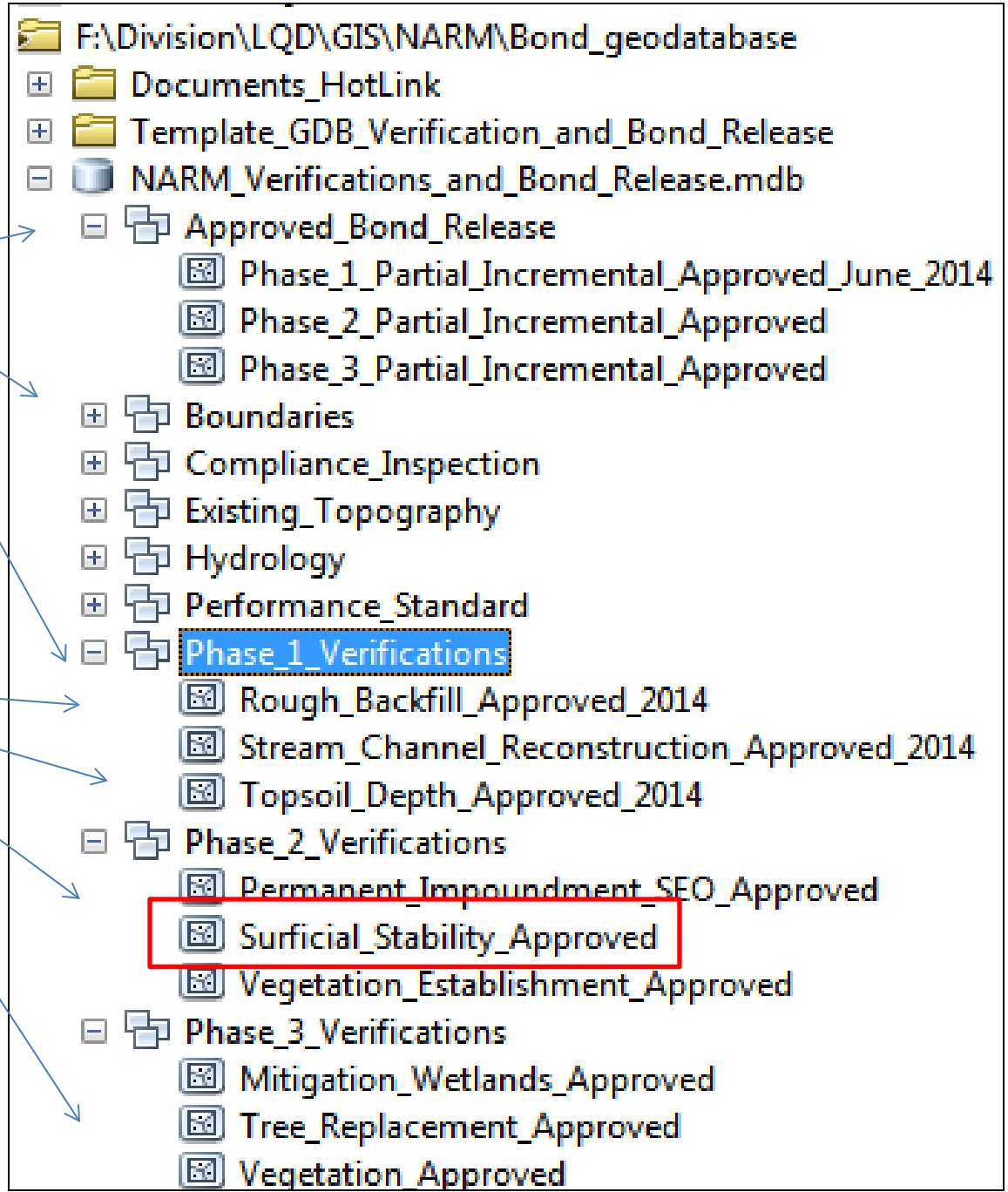
- Developed a system of spatial data exchange between the LQD and the operator for sending, verifying, and approving features of the Geodatabase.

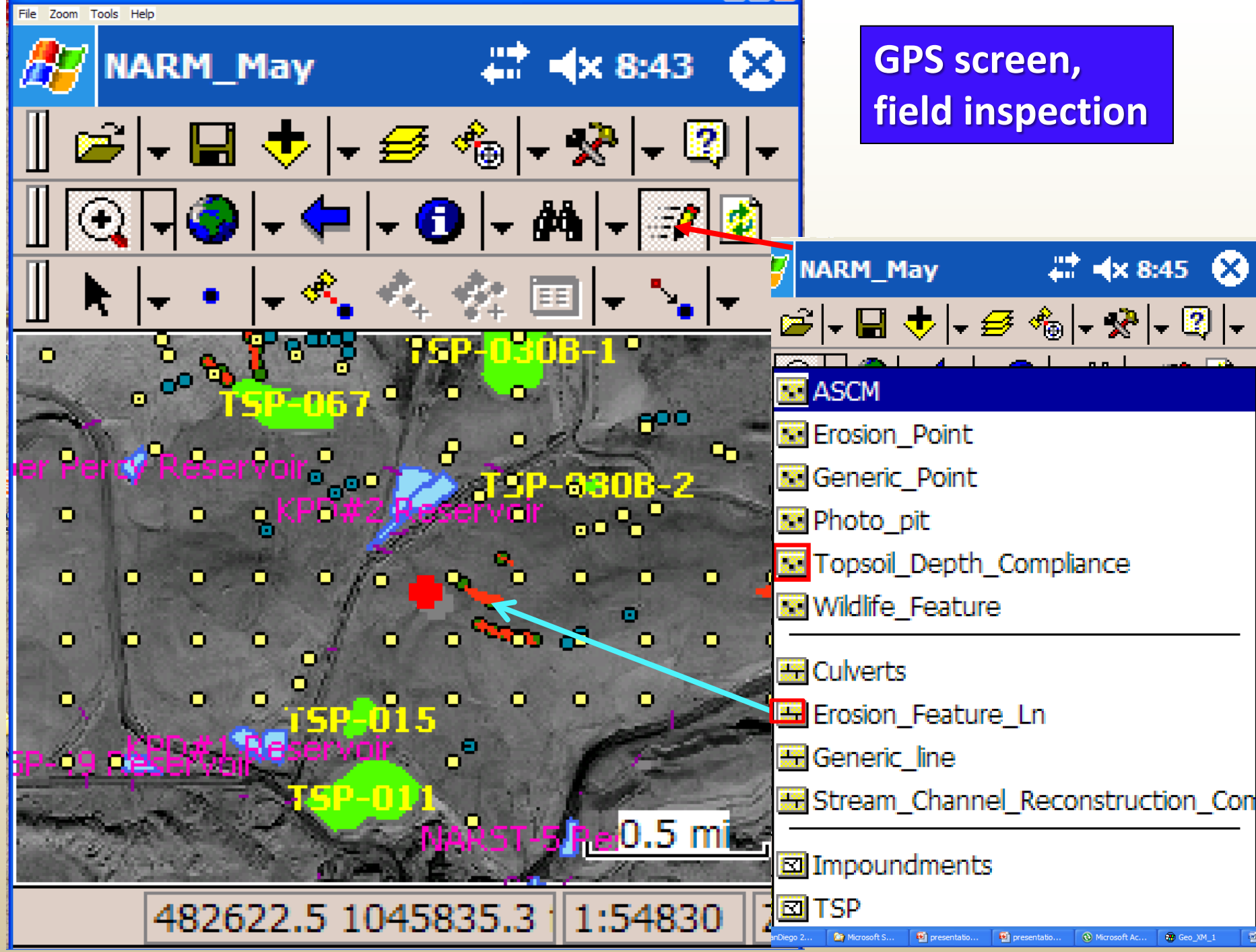
Structure of the geodatabase

Feature datasets

Criteria, bond release verification =
Feature classes

Data sets, feature classes, attribute fields and domains were chosen on the basis of the WYLQD Guidelines.





GPS screen, field inspection

Compliance assessment-checking for erosion features

Field name	Data type	Domains	Comments
Feature ID	text		Number
Inspection Date	date	Calendar	Date of the last inspection
Inspector Name	text	Waitkus	Choose the inspector name
Erosion Type	text	Rill active, Rill inactive Gully active, Gully inactive	Depth, width
Erosion Compliance	text	Acceptable, Not acceptable	A significant active or inactive feature is not acceptable
Erosion Compliance Date	date	Calendar	A target date when the erosional feature will be repaired
Cover status	text	Permanent seeded Temporary seeded Mulched	
Vegetation present	text	Yes, No	
Comments	text		
Photo_Link	text		Link to the folder: Documents_Hotlink

Tracking erosion features - photo hotlink

2009 December
NARM inspection

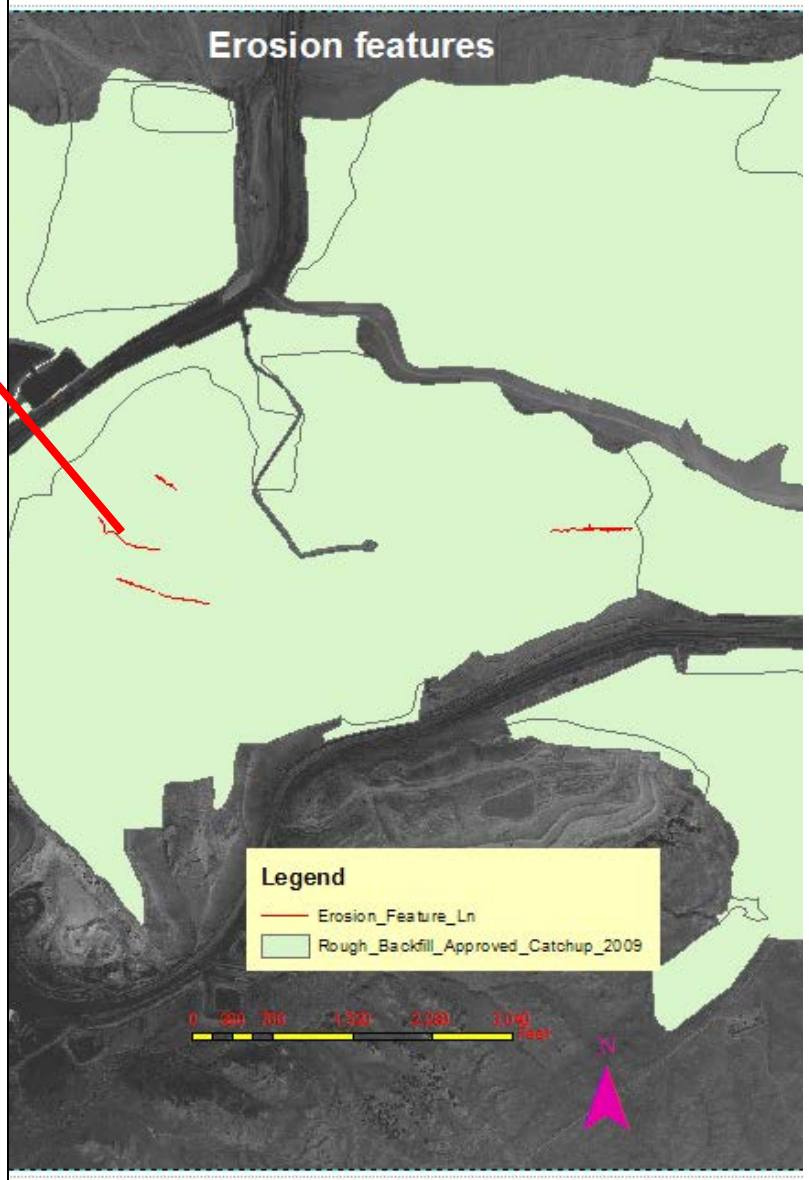
Photo No. 6 Looking at the gully located in the north eastern portion of the Antenna Mast area.

November 2009

December 2009

November 2009

December 2009



Benefits of Geodatabase- efficiency and quality

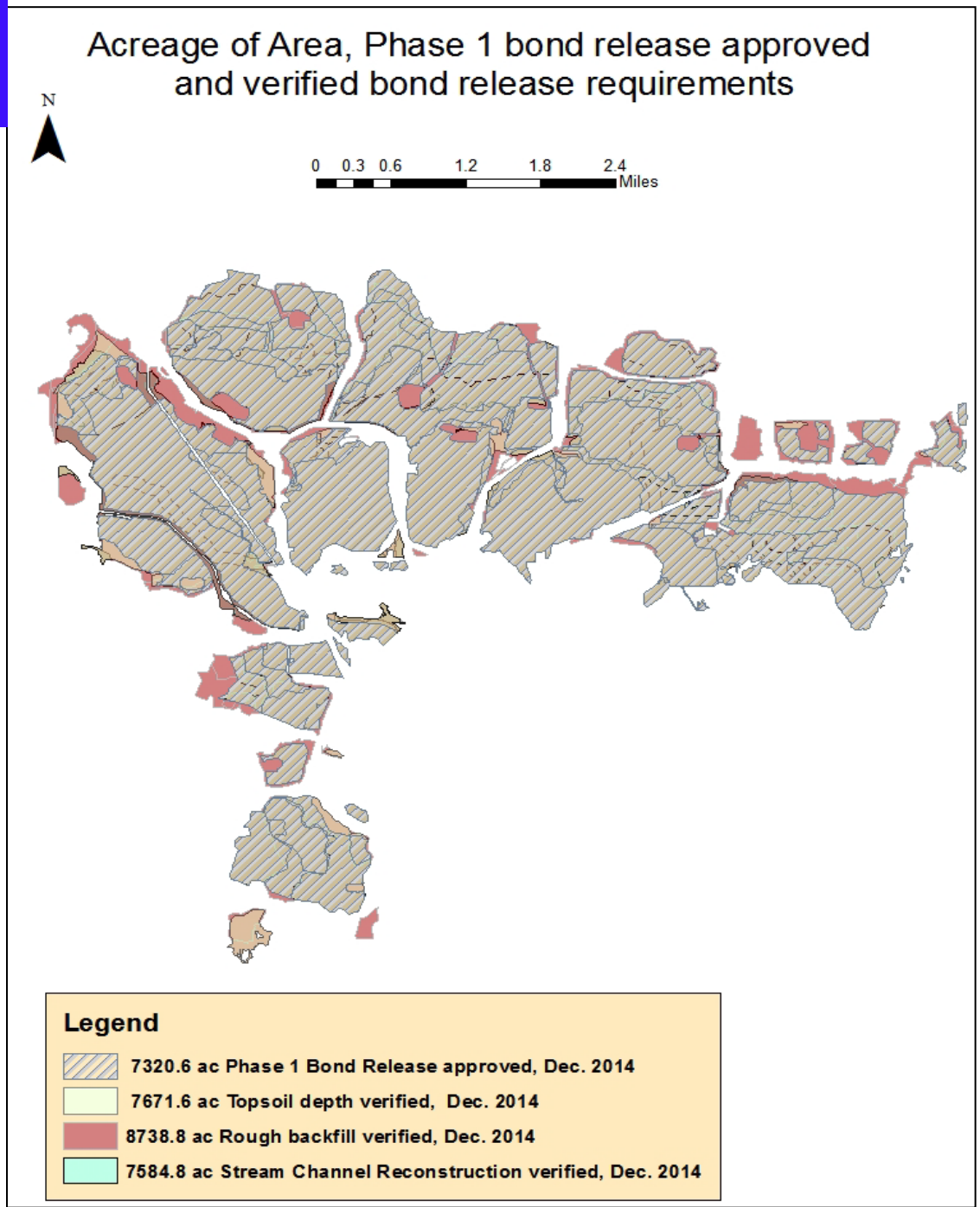
- Improving accuracy and transparency of the collected data.

- Tracking of all bond release verification criteria and performance standards.

- Streamlining data retrieval for reports and summaries.

- Decreasing time of preparing an inspection report by 50%.

- Compliance assessment - document the location and circumstances of incidents and events for further action or reporting.




Interstate Mining Compact Commission
Peabody Powder River Operations, LLC
North Antelope Rochelle Mine
Wyoming
THE ANNUAL KENES C. BOWLING COAL NATIONAL MINE RECLAMATION AWARD
2012
Interstate Mining Compact

Questions?